What is claimed is:

1. A lamp seal comprising a functionally gradient material and a lead bar; wherein the functionally gradient material has layers of mixtures of electrically non-conductive material and conductive material in which a layer at one end is non-conductive and a layer at an opposite end is conductive, with intervening layers in which the proportion of conductive material increases moving from said one end to said opposite end; wherein the lead bar passes through a hole extending through the functionally gradient material in a direction of between said ends; wherein the lead bar is attached in a conductive region of the functionally gradient material; and wherein the proportion of conductive material at a point of attachment of the lead bar to the functionally gradient material is no less than 0.6 Vol% and no more than 39 Vol%.

2. A lamp seal as described in claim 1, wherein said hole is cylindrical with an expanded diameter at the non-conductive end, such that the diameter of the cylindrical hole in the region from the non-conductive end of the functionally gradient material to the point of attachment of the lead rod, satisfies the condition $\mathbf{C} = 1.2\mathbf{d} \leq C \leq 0.6\mathbf{D}$, where **C** is the diameter of the cylindrical hole in the region from the non-conductive end of the functionally gradient material to the point of attachment of the lead rod, **d** is an outer diameter of the lead bar and **D** is an outer diameter of the functionally gradient material.

3. A lamp seal as described in claim 1, wherein the hole expands in a tapered form from the point of attachment toward the non-conductive end; and the thickness of the functionally gradient material from the point of attachment to the non-conductive end is less than its thickness at the point of attachment.

4. A lamp seal as described in claim 2, in which the outside diameter of the functionally gradient material at and near the non-conductive end is smaller than the outside diameter at the point of attachment.